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Challenges Associated with Sustainable Research Capacity Building: A Comparative Study between BRICS Nations and African Countries

Abstract

In alignment with the theme of the conference *Education in Developing, Emerging, and Developed Countries: Different Worlds, Common Challenges*, this paper brings attention to the challenges associated with the implementation of sustainable research capacity building (SRCB) in the context of BRICS nations and African countries. Employing a comparative document analysis method to explore the unique contexts of developing nations, this research provides insights and recommendations to strengthen research capacity in academia, address shared challenges and promote national prosperity. The scholarly literature revealed that higher education institutions (HEIs) in developing countries have intensified their efforts in building the research capacity of their academics and institutions. Regardless of their commitment, HEIs face challenges such as gender inequalities, teaching workloads, doctoral program deficiencies, lack of multidisciplinary research approaches and funding constraints. Addressing the challenges will require improved funding for research training and research productivity. One of the main concerns is that instead of advancing knowledge and being producers thereof, most developing countries remain knowledge consumers. The findings revealed that developing the next generation of academics plays a critical role in the sustainability of an emerging country's research system.

Keywords: research training, capacity building, sustainable research capacity building, higher education, developing countries, BRICS nations

Introduction

HEIs and their academics are placed under immense pressure by the competitive nature of academia. According to Mafenya (2019), increasing investment and resources dedicated to research is critical since it is through research, that new innovative educational and societal practices are established and prosperity is endorsed. Therefore, it is essential for adequate financial support to research and those individuals responsible for conducting it. The BRICS and African nations have devoted increased attention and resources to nurturing the research competencies of their academics. In turn, these emerging nations have managed to increase their research productivity, improve their global rankings, attract funding and promote national prosperity (Niemczyk, 2020). Universities house concentrated communities of talented scholars, world-class facilities and collective expertise. Therefore, HEIs assume the main role in preparing future researchers that are able to meet globalized expectations for their future careers within and outside academia (Niemczyk & Rossouw, 2018). Globalization has changed the

research environment, encouraging new methods of collecting and analysing data, altering communication in research communities and necessitating multidisciplinary and multicultural collaborations. In this context, academics are expected to develop top-notch research competencies in shorter periods of time, with limited resources. Consequently, it is critical for academics to continuously develop their research skills. Mafenya (2019) warned that without SRCB strategies in place, HEIs will find it challenging to fulfil their responsibility towards responding to the needs of society and contribute to the national development of their countries. Niemczyk (2020) reported that instead of advancing knowledge and being producers thereof, most developing countries remain knowledge consumers. Pushing the knowledge frontier is challenging for developing countries because they are pursuing a moving target. Employing a qualitative document analysis method, this study analysed 40 documents to explore the challenges associated with SRCB in BRICS nations and African countries.

Research and development landscape in BRICS nations

Research collaboration among BRICS countries has been ongoing since 2013. By pooling their resources, individual strengths and expertise, BRICS countries are well positioned to advance knowledge and enhance innovation. According to Niemczyk, de Beer and Steyn (2021), synchronising the functioning of their economies and education systems is unique due to the size of the BRICS organisation. Combined, the BRICS countries make up 26% of the world's surface, 42% of the total world population and 27% of the world's GDP (Niemczyk, de Beer & Steyn, 2021). Bornmann, Wagner and Leydesdorff (2015) highlighted that the BRICS nations contribute significantly to the global number of academics, scientists and engineers. To this end, there is little known doubt that BRICS nations take up a unique strategic position in research and development (R&D) on their respective continents, serving as role models to other developing countries in science and technology.

Zooming in on the first BRICS nation, the National Council for Scientific and Technological Development (CNPq) and the Coordination for the Improvement of Higher Education Personnel (CAPES) are key funding agencies supporting research in Brazil. However, recent budget cuts have affected research infrastructure funding and hindered research productivity. Consequently, the growth of emerging researchers has been disrupted, with decreases reported in the number of masters and PhD graduates due to insufficient investment from state entities. Meanwhile, the Russian government supports research through entities such as the Russian Foundation for Basic Research, which funds grants, conferences, and access to research databases for institutions. While Russia has seen a growth in scientific publications, there has been a concerning decline in patent applications, alongside fluctuations in the enrolment of doctoral students.

India has the lowest GDP ratio allocated dedicated towards R&D compared to the BRICS member states. Regardless, India still manages to rank as the third highest global producer of research output, showcasing its research prowess. Similar to China, a large portion of India's PhD graduates graduate from STEM fields such as mathematics and science. China's substantial investment in R&D is the highest among BRICS member states. The country's dedication to SRCB is in the establishment of research centres such as the Chinese Academy of Engineering, focusing on biotechnology and environmental research. South Africa leads Africa in terms of financial contribution dedicated to R&D. However, compared to other BRICS nations, South Africa's annual increase in R&D

investment has been relatively modest. The country's National Research Foundation plays a pivotal role in funding research initiatives and has significantly impacted the scientific landscape in South Africa since its establishment in 1999. The establishment of the NRF led to notable increases in scientific publications by the year 2018, although at a slower rate than other BRICS countries (Niemczyk, 2020).

BRICS nations have increased their investments in R&D, which has created economic growth and enhanced their capacity to advance the knowledge frontier similar to their international counterparts, especially in China and India. Although BRICS nations show economic progress, partnership with industry and improved research productivity is required to sustain economic growth (Niemczyk, 2020). Furthermore, if they are to contribute to developing solutions that are relevant to their own contexts, the development of the next generation of academics (doctoral students) must be prioritized through adequate investment and policy.

Research and development landscape in African nations

Knowledge production requires adequate financial investment, therefore developed countries lead the pack in terms of knowledge creation (Niemczyk, 2020). Focusing on the developing nations in Africa, after a global trend of massification, the number and size of HEIs in Africa have grown rapidly. Student enrolments in African HEIs have increased, from less than 200000 in the 1970s to over 5 million in the early 2000s (Zavale & Schneiderberg, 2022). In terms of Africa's research prowess, despite containing 12.5% of the global population (Duermeijer, 2018), Africa accounts for less than 1% of global research output (Duermeijer, 2018). It is promising that when Duermeijer explored data measuring the research performance of 8500 research institutions and 220 nations globally, using Elsevier's SciVal tool, Duermeijer found that Africa has by far the strongest growing scientific production. The evidence presented by the author was that between the years 2012 and 2016, African HEIs increased research productivity by 38.6% and increased the number of authors by 43%, which is 10% higher (33%) than the next fastest growing author population in the world (the Middle East) in the same time period (Duermeijer, 2018).

Zooming in on countries located on the continent of Africa, Ethiopia has a thriving research environment (Duermeijer, 2018). Senegal has implemented a policy to provide top-notch resources to their researchers to support their research endeavours and put measures in place to mitigate the challenges their researchers face (Duermeijer, 2018). Egypt, Tunisia and Nigeria's research productivity, investment in research and RCB initiatives have been growing at a consistent rate. Egypt's thriving research environment, characterized by strong research infrastructure and experienced researchers, has propelled the country to maintain its top rank in Africa for the third consecutive year since 2020. Egypt's research prowess is evident in the fact that the country produced 27% of Africa's total output of international publications. Furthermore, the country excels in key fields such as agriculture, chemistry, engineering, immunology, microbiology, physics, and mathematics. In 2022, Tunisia's gross domestic expenditure on R&D as a percentage of GDP was 0.61%, which was slightly lower than Egypt's expenditure. Over the years 2000 to 2018, Tunisia significantly increased its scientific and technical journal outputs by 4916. The Ministry of Higher Education and Scientific Research in Tunisia plays a key role in supporting research, fostering international

cooperation, and collaborating with countries like South Africa through agreements aimed at enhancing scientific and technological cooperation.

Despite the research potential of Nigeria, Africa's most populous country, the nation is burdened by diseases (Ezeanolue et al., 2019). A lack of skilled research practitioners, inadequate funding, and under-equipped laboratories hinder sustainable disease prevention and treatment strategies in the country (Ezeanolue et al., 2019). Notably, Nigeria's gross domestic expenditure on R&D in 2022 stood at 0.13% of GDP, well below the global average, reflecting a historical underinvestment in science, technology, and innovation. Despite initiatives like the Tertiary Education Trust Fund providing research funding, Nigeria continues to lag behind in research investment compared to developed nations, making it challenging for Nigerian researchers to compete globally.

Challenges hindering the effective implementation of sustainable research capacity building

Based on the review of the scholarly literature, it is evident that the implementation of SRCB comes with challenges and requires the preparation of educational leaders and research practitioners. The successful implementation of SRCB will depend on the extent to which the challenges towards SRCB are identified and addressed. After analysing the scholarly literature each article revealed different yet pressing challenges that HEIs face when building research capacity. In addition to the challenges, scholars provided recommendations to stakeholders (management, researchers, and government) to consider when addressing challenges towards building research capacity. The challenges are many, this section focuses on the main five and provides recommendations for improvement.

The first challenge, as reported from Africa (Marongwe et al., 2022), is that women researchers experience negative impacts of organisational and structural gender inequalities. Consequently, negative ramifications follow such as low contribution to published research on the part of women and a scarcity of women being the lead author of publications. In terms of promotion, men are three times more likely than women to reach top-level positions in the sciences and research. To achieve certain career milestones, during their childbearing life stage, women are expected to demonstrate extraordinary capacity and performance.

The challenges women face are exacerbated by the second challenge, which is to demonstrate high levels of research productivity while balancing overwhelming teaching workloads and time constraints, leading to stress, pressure and burnout for academics. South African academics were expected to complete administration, teach, mark and engage in their family responsibilities in unfamiliar circumstances during the pandemic. Margongwe et al. (2022) reported that the large teaching load and obligations place strain on academics as they are unable to conduct research efficiently due to their heavy schedule. The previously mentioned authors, reporting from Africa informed that academics employed in these institutions educate 50% more students than their peers employed in the global arena.

Many doctoral and training programs in BRICS and African nations are inadequate (Ezeanolue et al., 2019), therefore, programs do not equip researchers with the necessary research capacity to conduct research in diverse research environments, which accounts for the third challenge (Niemczyk, 2019). In Brazil, the shortcomings of the research system are due to a lack of investment and resources in doctoral programs. Under such

conditions, Mafenya (2019) predicted that it would be challenging to attract and retain highly qualified, young academics. As a consequence, HEIs experience a low rate of innovative ideas, and a weak capacity for research, creativity and critical thinking. A starting point to respond to the challenge is to provide clear stipulations of the type of experiences, knowledge and skills that doctoral students should possess (Niemczyk & Rossouw, 2018).

Mafenya (2019) observed that integrating research from different disciplines has received growing attention in academia and has become a part of funding criteria. In fact, Niemczyk (2022) informs that in academia, collaborating with a variety of disciplines has become mandatory. However, the fourth challenge is that research, especially in the Faculty of Education, has been mono-disciplined, lacking multidisciplinary, interdisciplinary and transdisciplinary approaches. Although mono-disciplinary approaches have advanced the frontiers of knowledge in many disciplines, multidisciplinary methods have enhanced the understanding of observed phenomena from multiple perspectives.

Ezeanolue et al. (2019) reported that inadequate funding from the state and HEIs is arguably the biggest challenge hindering SRCB, which accounts for the last challenge. As indicated by Niemczyk and Rossouw (2018), delivering quality research outputs, to promote national prosperity can only be achieved if adequate investments are made in the development of citizens responsible for research output. In fact, a prerequisite to increasing research productivity is sustained financial investments for developing capacity. Inadequate funding of the state is compounded by limited internal funding (in HEIs) directed at supporting research, developing research skills and travelling abroad for conferences. Although efforts are made to fund research projects through external sources (Mafenya, 2019), securing external funding is highly competitive (Niemczyk, 2020). A lack of funding (especially in developing countries) is one of the biggest challenges hindering research training and research productivity. The potential of research to address challenges in Africa is often undervalued by government officials and policy-makers as indicated by their lack of commitment and negligible support for research.

Similarities and differences between BRICS nations and African countries

Comparative research differs from non-comparative studies because it identifies the differences and similarities between contexts under investigation and relationships between contexts with consideration to their contextual conditions. Knowing that similarities and differences exist between education systems is not enough; therefore, this study paid attention to contextual conditions of the countries under study to uncover why similarities and differences exist.

In this regard, the similarities between BRICS nations and African nations are grounded in their increased investments in R&D to drive economic growth and enhance knowledge production. Both regions recognize the importance of funding agencies in fostering research SRCB. Additionally, both BRICS and African nations emphasize the need to prioritize the development of the next generation of academics through adequate investment and policy support. As per the differences, the BRICS nations have global influence and leverage due to their vast surface area, population size, GDP and trade share. These countries have made substantial R&D investments, with China standing out as the highest investor among the BRICS states. On the other hand, African nations face

challenges such as historical underinvestment in R&D, leading to lower research output and limited resources for research infrastructure.

The contextual conditions that cause the aforementioned similarities and differences can be attributed to the economic development of the country, the historical background of developing nations, government and HEI policies supporting research and collaboration with international partners. The BRICS nations generally have stronger economies and well-established research infrastructures compared to many African countries, allowing them to invest more in R&D and drive scientific progress. In contrast, African nations often face challenges related to limited resources, including funding and infrastructure which impact their research productivity and ability to compete globally. Addressing these contextual factors through increased investment, policy support and research collaboration can assist both BRICS nations and African countries to further advance their research and development landscapes.

Conclusion

The scholarly literature revealed that the implementation of SRCB in the context of BRICS nations and African countries plays an essential role in promoting national prosperity. The associated challenges include gender inequalities, high teaching workloads, inadequate doctoral programs, lack of multidisciplinary research approaches, and insufficient funding. Despite these challenges, there have been notable efforts and progress in building the research capacity in the emerging nations under investigation, particularly in terms of increased research productivity and international collaborations. Responding to challenges in developing nations such as poor disease management, poor infrastructural development, food insecurity and the effects of climate change will require sustainable investment in research. By improving investment in R&D in BRICS nations and Africa, these countries will be able to harness its potential to develop solutions applicable to their population. Current research practitioners, research infrastructure and available funding in most developing countries are not resilient enough to address the challenges of the 21st century. To this end, promoting national prosperity in developing countries, in a sustainable manner, will require HEIs to develop the next generation of academics by enhancing the quality of their doctoral programs.

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